GENETHA ANNE GRAY

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EDUCATION

Rice University, Houston, Texas *Aug 1997 - May 2002*

Ph.D., Computational and Applied Mathematics (CAAM), May 2002.

- *thesis:* "A Variational Study of the Electrical Impedance Tomography Problem"
- *advisors:* Dr. Liliana Borcea and Dr. Yin Zhang

M.A., Computational and Applied Mathematics, May 2001.

California State University, Sacramento *Aug 1995 - May 1997*

M.A., Mathematics, May 1997.

University of California, Davis *Sept 1989 - June 1993*

B.S., Mathematics, June 1993.

WORK EXPERIENCE

Sandia National Laboratories, Livermore, California *Aug 2002 - present*

Post Doctoral Researcher in the Computational Sciences and Mathematical Research Department. Involved in the following projects:

- Development of an integrated computational/experimental model to address the questions of transmembrane protein structure.
- Parameter identification in a computer simulation of a semiconductor bridge.
- Maintenance and revision of a C++ parallel optimization software code, Asynchronous Parallel Pattern Search (APPS).

Sandia National Laboratories, Livermore, California *summer 1998*

Intern in the Scientific Computing Division. Worked with C code for solving large unconstrained minimization problems found in computational chemistry.

Bayer Laboratories, Berkeley, California *1995*

Biotechnician in the Recombinant Factor VIII Division. Responsible for carrying out FDA protocol designed to purify products used in the production of blood clotting drugs.

Calgene, Davis, California *1991-1994*

Research associate and *Intern* in the Tomato Research and Development Group. Carried out various bench top biology processes (westerns, southerns, PCR, and cloning) as well as sterile tissue culture and seed germination assays. Also participated in field trial studies and data collection and analysis.

PAPERS AND TECHNICAL REPORTS

G.A. Gray, T.G. Kolda, K.L. Sale, M.M. Young, "Optimizing an empirical scoring function for transmembrane protein structure determination," August 2003, Sandia Technical Report SAND2003-8516, Livermore, CA, August 2003 (submitted to *INFORMS Journal on Computing, Special Computational Biology Issue*).

L. Borcea, G.A. Gray, Y. Zhang, "Variationally Constrained Numerical Solution of Electrical Impedance Tomography," *Inverse Problems*, vol. 19, pp. 1159 - 1184, 2003.

K.L. Sale, J-L. Faulon, G.A. Gray, J. Schoeniger, M.M. Young, "Optimal bundling of the transmembrane helices of integral membrane proteins using sparse distance constraints," in preparation for submission to *Protein Science*.

K.R. Kavanaugh, J.P. Reese, C.E. Kees, C.T. Kelley, C.T. Miller, A.J. Booker, J.E. Dennis, Jr, D.E. Finkel, M.W. Farthing, G. Couture, G.A. Gray, T.G. Kolda, "A comparison of Optimization Methods for Problems Involving Flow and Transport Phenomena in Saturated Subsurface Systems," in preparation for submission to *Advances in Water Resources*.

L. Borcea, G.A. Gray, Y. Zhang, "Variationally Constrained Numerical Solution of Electrical Impedance Tomography," CAAM Department Technical Report TR02-13, Rice University, Houston, TX, Dec. 2002.

G.A. Gray, "A Variational Study of the Electrical Impedance Tomography Problem," doctoral thesis, Rice University, CAAM Department Technical Report, TR02-02, May 2002.

TEACHING AND MENTORING EXPERIENCE

Rice University, Houston, Texas *1997-2000*

Teaching Assistant and *Grader:* taught recitation, held office hours, prepared homework solutions, and assisted with exam preparation and grading for undergraduate and graduate courses.

Alliance for Graduate Education and the Professoriate *summers 2000 and 2001*

Mentor for undergraduate and high school students in science, engineering, and math in the AGEP program held at Rice University.

California State University, Sacramento *1995-1997*

Instructor and *Tutor:* Responsible for preparing and delivering lectures and assigning and grading all homework and exams for undergraduate courses; Member of the staff at the drop in tutoring center provided for students taking undergraduate math courses.

PRESENTATIONS

May 2003 Program for Women in Mathematics: Summer Session on Bio Math, Institute for Advanced Studies, Princeton, NJ, lecture: "Two Examples of Simulation Based Optimization"

May 2003 Tenth Anniversary Reunion of the Program for Women in Mathematics, Institute for Advanced Studies, Princeton, NJ, poster presentation: "Derivative-Free Optimization for Transmembrane Protein Structure Determination"

May 2003 California State University, Hayward, seminar: "Two Examples of Simulation Based Optimization"

April 2003 Simulation and Optimization Workshop, Statistics & Applied Mathematical Sciences Institute (SAMSI), Research Triangle Park, NC, poster presentation:"Derivative-Free Optimization for Transmembrane Protein Structure Determination"

March 2003 Fourth Bay Area Numerical Analysis Day, Stanford University, Palo Alto, CA, presentation: "Derivative-Free Optimization for Transmembrane Protein Structure Determination"

February 2003 SIAM Conference on Computational Science & Engineering, San Diego, CA, contributed talk: "Transmembrane Protein Structure Determination"

July 2002 SIAM Annual Meeting, Philadelphia, PA, minisymposium presentation: "A Variational Study of the Electrical Impedance Tomography Problem"

July 2002 AWM Workshop, SIAM Annual Meeting, Philadelphia, PA, poster presentation: "A Variational Study of the Electrical Impedance Tomography Problem"

June 2002 Free University, Brussels, Belgium, seminar: "A Variational Study of the Electrical Impedance Tomography Problem"

September 2001 Keck Center Annual Research Conference, Galveston, TX, poster presentation: "The Use of Variational Methods in Medical Imaging"

July 2001 SIAM Annual Meeting, San Diego, CA, poster presentation: "Variational Constraints for the Electrical Impedance Tomography Problem"

May 2001 University of Texas Medical Branch (UTMB) Symposium, Galveston, TX, poster presentation: "Using Variational Principles to Regularize the Electrical Impedance Tomography Problem"

April 2001 SIAM Southwestern Regional Mathematics in Industry Research, Houston, TX, panelist: "Industrial Internships"

October 2000 Keck Anniversary Symposium, Houston, TX, poster presentation: "A Study of Variational Methods for Solving the Problem of Electrical Impedance Tomography"

October 1999 Keck Center Annual Research Conference, Galveston, TX, poster presentation: "Electrical Impedance Tomography for Noninvasive Measurements of the Lung Resistivity"

RESEARCH INTERESTS AND SKILLS

- *Research interests:* Computational Biology, Optimization, and Inverse Problems.
- *Platforms used:* Unix, Linux, Windows, and Macintosh environments.
- *Programming skills:* Fortran 90, C, C++, MPI, Matlab, LaTeX and html.

HONORS AND AWARDS

W.M. Keck Center for Computational Biology predoctoral fellow	*1999-2002*
SIAM student travel award	*July 2001*
George R. Brown Computational Engineering fellowship	*2000-2001*

PROFESSIONAL LEADERSHIP AND VOLUNTEER WORK

Science Buddies Advisor	*2002-2003*
Sandia Math & Science Awards Banquet hostess and mentor	*2003*
SIAM committee on the annual meeting.	*2001-2003*
Rice University CAAM department graduate recruitment committee.	*1999-2000*
Judge for the Texas State Science Fair	*1999, 2000, & 2002*

PROFESSIONAL MEMBERSHIPS

Society for Industrial and Applied Mathematics (SIAM)

American Mathematical Society (AMS)

Association for Women in Mathematics (AWM)

Association for Computing Machinery (ACM)

Institution for Operations Research and the Management Sciences (INFORMS)